

## REMARKS

Reconsideration and allowance of the subject application are respectfully solicited in view of the following remarks.

Claims 1-27 are now presented for examination. Claims 1, 8, 12, 19, 23 and 24-27 are the only independent claims.

Claims 1-24 have been rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,659,664 (Kaja) in view of U.S. Patent No. 5,913,193 (Huang, et al.). This rejection is respectfully traversed for the following reasons.

### Independent Claims 1, 12, 23, and 25-27

Independent Claims 1, 12, and 23 are directed to a speech synthesis arrangement having a database that manages phonemic piece data. According to the arrangement, a first polyphone is generated in consideration of a phonemic context fro a phoneme as a search target. The database is searched for phonemic piece data corresponding to the first polyphone. A second polyphone is generated by changing the phonemic context based on the search result and the database is re-searched for phonemic piece data corresponding to the second polyphone. The search result obtained in the search or the re-search is registered in a table in correspondence with the first or second polyphone.

Independent Claims 25-27 are directed to a speech synthesis apparatus arrangement having a database that manages phonemic piece data. According to the arrangement, a polyphone is generated in consideration of a phonemic context for a phoneme as a search target. The database is searched for a phonemic piece data corresponding to the polyphone. The database is

re-searched for phonemic piece data corresponding to the phoneme. The search result obtained by the search or re-search is registered in a table in correspondence with the polyphone.

As to these independent claims, Applicant submits that the Office not satisfied its burden of proof to establish a prima facie case of obviousness for the following reasons.

MPEP § 2142 states that “...examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness”. In addition, MPEP § 2142 requires the Office Action to cite art showing *all* the claimed features. Thus, to reject Claim 1, for example, the Office Action must cite art that shows the generating, search, and re-search means recited by Claim 1. As a result, the Office Action cites the Kaja and Huang, et al. patents to show these features.<sup>1</sup> But the specific passages of these patents that the Office Action identifies as showing these three means are merely understood to make general statements about speech synthesis using multiple phonemes. Thus, the only passage of the Kaja patent cited in the Office Action, column 2, lines 63-65, merely states “The present invention also provides for polyphone speech synthesis, that is to say, the interconnection of several phonemes, for example triphone synthesis, or quadrophone synthesis”. And the only portion of the Huang, et al. patent cited to show these three means, column 1, line 47, merely states: “The use of longer units having three or more phonemes per unit helps reduce the number of boundaries which occur...”. To buttress these passages and to complete its obviousness argument, the Office Action states: “Diphones and triphones models [sic] inherently rely upon the context of adjacent phonemes.”

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<sup>1</sup>The March 24, 2005 Office Action does not provide detailed grounds of rejection. Instead it refers to the April 15, 2003 Office Action. Accordingly, when Applicant refers to the outstanding Office Action, Applicant refers to both the March 24, 2005 and April 15, 2003 Office Actions.

But the Office Action's obviousness argument is understood to suffer at least two fatal defects.

First, it appears to assume that these unspecified diphone and triphone models—which are not of record—all work in the same manner and use “context” in the same manner, or at least use phonetic context as recited in the claims such as Claim 1 to store a correspondence between a phonetic data database and generated polyphones. But there is no evidence of record for this assumption. There are understood to be many ways to obtain and store a correspondence between the contents of a phonetic data database and generated polyphones. Claim 1 merely provides one such apparatus for performing one specific method for obtaining such a correspondence. Absent the citation of specific art showing the specific features of the generating, search, and re-search means recited by Claim 1, the Office is not understood to have satisfied its burden of proof to establish a prima facie case of obviousness against Claim 1. And the passages cited in the Office Action, by themselves, are understood to be clearly inadequate to show the generating, search, and re-search means recited in Claim 1.

Second, even assuming arguendo that one of the unspecified triphone models referred to in the Office Action inherently relies in some way upon the context of adjacent phonemes, there is no evidence of record that it would be obvious to generate a correspondence between generated phonemes and a phonetic data database by the specific method recited by Claim 1, i.e., generating a first polyphone in consideration of a phonemic context for a phoneme as a search target, searching a database for a phonemic piece data corresponding to the first polyphone, and generating a second polyphone by changing the phonemic context on the basis of the search result obtained by the search means, and re-searching the database for phonemic piece data

corresponding to the second polyphone. Absent the citation of a specific reference suggesting the generating, searching, and re-searching recited in Claim 1, the Office is not understood to have cited art showing these features, and therefore has not established a prima facie case of obviousness against Claim 1.

Turning to parts of the Kaja patent not discussed in the Office Action, this patent may disclose using numeric methods in an iterative process which, by stages, ensures that a synthetic phrase more and more resembles a natural phrase and extracting control parameters from the synthetic phrase (see lines 35-43 of column 3). But even this portion of the Kaja disclosure is not understood to teach or suggest a re-search arrangement of generating a second polyphone by changing the phonemic context on the basis of the search result obtained in a previous search for phonemic piece data based on a first polyphone, and re-searching the database for phonemic piece data corresponding to the second polyphone as in the present invention.

Since the cited art is not understood to disclose or suggest all the claimed features, as required by MPEP § 2142, Applicant submits that the Office has not yet established a prima facie case of obviousness against Claim 1. Therefore, Applicant respectfully requests that the rejection of Claim 1 be withdrawn. And because independent Claims 12, 23, and 25-27 recite similar features, Applicant respectfully requests that the rejection of these claims also be withdrawn for similar reasons.

MPEP § 2142 also requires that there “be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings”. But Applicant submits that the Office

Action also fails to satisfy its burden of proof to establish this criterion of obviousness for the following reasons.

Initially, the Office Action admits that the Kaja patent fails to disclose or suggest the registering of the search result in a table, as recited by Claim 1. For that reason, the Office Action cites the Huang, et al. patent.

The Huang, et al. patent has been cited as teaching storage relying on a table of senones (i.e., cluster of similar markov states across different phonetic models) stored in HMM storage 24. The senones of Huang, et al. are used by an iterative algorithm that alternates between segmenting input speech given a set of Hidden Markov Model parameters and re-estimating the HMM parameters given the speech segmentation. The algorithm is stopped when convergence is reached. But it is not seen that Huang, et al.'s HMM senone storage and algorithm using such storage to provide convergence in any manner suggests the features of searching a database for phonemic piece data corresponding to a first polyphone in consideration of phonemic context for a phoneme, then generating a second polyphone by changing the phonemic context based on the search and researching the database for phonemic piece data corresponding to the second polyphone. Further, the storage of senones for use in re-estimating an HMM model in Huang, et al. is not seen as suggesting in any manner the feature of registering a search result obtained from a search based on a first polyphone or a re-search based on a second polyphone as in the present invention.

With regard to the cited combination, Kaja only teaches using numeric methods in an iterative process which, by stages, ensures that a synthetic phrase more and more resembles a natural phrase and extracts control parameters from the synthetic phrase and Huang, et al. is

limited to teaching senone storage used to provide convergence of an algorithm using an HMM model. It is not seen that the addition of Huang, et al.'s senone storage to Kaja's iterative numeric process to make a synthetic phrase resemble a natural phrase in any manner suggests the features of:

- searching a database for phonemic piece data corresponding to a polyphone generated in consideration of phonemic context for a phoneme as a search target;
- generating a second polyphone by changing the phonemic context based on the search result; and
- re-searching the database for phonemic piece data corresponding to the second polyphone combined with the feature of registering the search result obtained in the search or in the re-search a table on correspondence with the first or second polyphone.

In the absence of any suggestion in either the Kaja patent or the Huang, et al. patent to produce this combination of features, as recited in Claim 1, Applicant respectfully submits that the Office Action has not satisfied its burden of proof to establish the factual basis for the necessary motivation to combine the applied art to produce the invention of Claim 1. Therefore, Applicant respectfully requests that the rejection of Claim 1 be withdrawn for this additional reason. And because independent Claims 12, 23, and 25-27 recite similar features, Applicant respectfully requests that the rejection of these claims also be withdrawn for similar reasons.

Page 5 of the April 15, 2003 Office Action, which discusses the motivation to modify the Kaja device to use a table, does not contradict this analysis. The Office Action fails to point to any suggestion in the references to add a table to Kaja's iterative numeric process to make a synthetic phrase resemble a natural phrase. Rather, page 5 of this Office Action provides the

following motivation to add the table from the Huang, et al. patent to the device described in the Kaja patent:

....[the use of a table in Huang, et al. ] will increase the probability of the HMM generating correct parameters. The desirability to generate correct parameters is the reason proper storage in a table is obvious.

But this argument depends on the assumptions that using a table in the Kaja device will generate correct parameters, while the lack of use of such a table in the Kaja device will generate incorrect parameters. Otherwise, the Office Action does not articulate any reason to modify the Kaja device to produce the claimed invention. And the Office Action has provided no evidence for the accuracy of these assumptions.

Second, this argument depends on the assumption that such a modification of the Kaja device will result in an operative device. But, again, the Office Action provides no evidence for this assumption. And, since MPEP § 2142 places the burden of proof on the Office to establish there be a reasonable expectation of success when modifying the art to produce the claimed invention, for this additional reason, the Office is not understood to have established a prima facie case of obviousness against Claims 1, 12, 23, and 25-27.

#### Independent Claims 8, 19, and 24

Pending independent Claims 8, 19 and 24 are directed to a speech synthesis arrangement that performs speech synthesis by using phonemic piece data managed by a database. According to the arrangement, a table for managing position information indicating the position of phonemic piece data in the database is stored in correspondence with a phoneme obtained in consideration

of a phonemic context made to correspond to the phonemic piece data. Phonemic context information of the phoneme as a synthesis target of fundamental frequencies corresponding thereto are acquired and an average of the acquired fundamental frequencies is calculated. A phoneme group corresponding to the phonemic context information is searched in the table. Position information of the phonemic piece data corresponding to a predetermined phoneme of the searched phoneme group is acquired from the table on the basis of the calculated average fundamental frequencies. The phonemic piece data indicated by the position information acquired from the database is acquired and the prosody of the acquired phonemic piece data is changed.

Huang, et al. may teach that a stream of phonemes obtained from converting a word string into a stream of phonemes which are transmitted to a prosody engine along with word tags. The prosody for each phoneme in Huang, et al. is determined on a sentence basis but can be words or multiple sentences. In contrast to Huang, et al., it is a feature of Claims 8, 19 and 24 that phonemic context information of the phoneme as a synthesis target of fundamental frequencies corresponding thereto are acquired and an average of the acquired fundamental frequencies is calculated. A phoneme group corresponding to the phonemic context information is searched in the table and position information of the phonemic piece data corresponding to a predetermined phoneme of the searched phoneme group is acquired from the table on the basis of the calculated average fundamental frequencies. The phonemic piece data indicated by the position information acquired from the database is acquired and the prosody of the acquired phonemic piece data is changed. It is not seen that the prosody determination of Huang, et al. using a stream of phonemes with tags on a sentence basis in any manner teaches or suggests changing the prosody of acquired phonemic piece data based on a search of a table for managing position information



indicating the position of phonemic piece data as in Claims 8, 19 and 24. It is also not seen that Kaja teaches the combination of features of Claims 8, 19 and 24. Accordingly, it is believed that pending Claims 8, 19 and 24 are completely distinguished from any combination of Kaja and Huang et al. and are allowable.

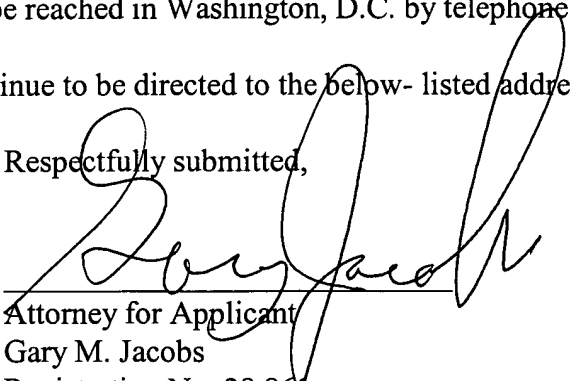
A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing remarks, Applicant respectfully requests favorable consideration and reconsideration and early passage to issue of the present application.

Applicant's attorney, Gary Jacobs may be reached in Washington, D.C. by telephone at (202) 530-1010. All correspondence should continue to be directed to the below- listed address.

Respectfully submitted,



Attorney for Applicant  
Gary M. Jacobs  
Registration No. 28,861

FITZPATRICK, CELLA, HARPER & SCINTO  
30 Rockefeller Plaza  
New York, New York 10112-3801  
Facsimile: (212) 218-2200  
GMJ/gmc

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